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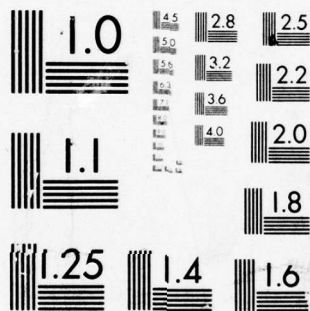


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DEFENSE SYSTEMS MANAGEMENT SCHOOL

STUDY TITLE: DEVELOPMENT CONCEPT PAPER - SYSTEM X

STUDY GOALS: To provide a realistic DCP for System X background and to provide insight into preparation of a DCP under today's policies.

STUDY REPORT ABSTRACT : The Development Concept Paper (DCP) provides a 20 page Service position summary of major systems for consideration by the Defense Systems Acquisition Review Council. The DCP is required by DODD 5000.1. No format is specified by OSD, but generally acceptable formats have been generated over the years by the Services and OSD. Some of the formats are described in the report and a composite format is used for the System X DCP. The DCP must define issues, problems, program objectives, program plans, performance parameters, risk areas, system alternatives, test and evaluation data, acquisition strategy and thresholds. A DCP, approved by the Secretary of Defense, constitutes a contract between OSD and the Service. It is updated as needed and not less often than necessary to meet the DSARC milestones.

KEY WORDS: MATERIEL DESIGN AND DEVELOPMENT WEAPON SYSTEMS
DECISION MAKING PROGRAM MANAGEMENT

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BERNARD P. MANDERVILLE, JR.
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DEFENSE SYSTEMS MANAGEMENT SCHOOL



PROGRAM MANAGEMENT COURSE INDIVIDUAL STUDY PROGRAM

DEVELOPMENT CONCEPT PAPER -- SYSTEM X

STUDY REPORT

PMC-74-1

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DEVELOPMENT CONCEPT PAPER

SYSTEM X

AN EXECUTIVE SUMMARY

OF A

STUDY REPORT

BY

BERNARD P. MANDERVILLE, JR.

MAJOR, US ARMY

MAY 1974

DEFENSE SYSTEMS MANAGEMENT SCHOOL

PROGRAM MANAGEMENT COURSE

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FORT BELVOIR, VIRGINIA 22060

EXECUTIVE SUMMARY

The Development Concept Paper (DCP) is a singularly important document in the life of a major system. It is used to describe to OSD the need for a system, issues, problems, objectives, plans, performance, risks, alternatives, test and evaluation considerations, acquisition strategy and thresholds for cost, performance and schedule. When approved by the Secretary of Defense, it constitutes a contract between OSD and the Service.

DODD 5000.1 specifies the need for the DCP, but does not provide an outline. Over the years, the Services have developed guidance outlines and enough DCP's have been written to provide specific how to do it information to prepare a DCP. Additionally, the OSD cognizant staff officer will provide guidance as to what outline should be followed.

The DCP prepared for this report reflects several DCP's and the guidance provided in Army documentation. It has received a preliminary review by some OSD staff personnel and reflects their comments.

Some general comments from the staff members were: compare the proposed acquisition with current systems; address foreign developments that provide alternatives; indicate joint Service interest; and describe competing technical approaches. These comments reflect current policy that influences their review of DCP's.

Other staff comments dealt specifically with the DCP as related to System X. Weaknesses in the technical area were particularly the subject of some comments. These exist primarily because of the weakness in the technical system descriptions in the System X exercise material used for DCP preparation.

The DCP could provide a useful background document for future System X exercises, if the cost and schedule data can be improved. The outline and content provide a basis from which one could begin to prepare a DCP in an actual situation.

ACKNOWLEDGEMENTS

I appreciate the aid received from Mr. E. Nucci, OSD, for permitting me to research the DCP files. To Mr. R. Thorkildsen of OSD for his help in reviewing and having others review and comment on the DCP draft. To Messrs. F. Horton, J. Croskery, T. Christie and Captain G. Marshall (USN) of OSD for their time and their comments on the DCP. To CDR R. Matzner, DSMS, for his guidance and to Mr. W. Cullin, DSMS, for his review and comment.

DEVELOPMENT CONCEPT PAPER

SYSTEM X

STUDY REPORT

PRESENTED TO THE FACULTY

OF THE

DEFENSE SYSTEMS MANAGEMENT SCHOOL

IN PARTIAL FULFILLMENT OF THE

PROGRAM MANAGEMENT COURSE

CLASS 74-1

BY

BERNARD P. MANDERVILLE, JR.

MAJOR, US ARMY

MAY 1974

This study represents the views, conclusions and recommendations of the author and does not necessarily reflect the official opinion of the Defense Systems Management School or the Department of Defense.

Section I. INTRODUCTION

The purpose of this report is to present a draft Development Concept Paper (DCP) for the Defense Systems Management School acquisition model, "System X". The DCP for "System X" is to be incorporated as part of the exercise for future classes attending the Program Management Course.

Since the DCP represents a "purple suited" system, it should reflect the format and content of typical DCP's written by the three Services, reviewed by the Defense Systems Acquisition Review Council (DSARC) and approved by the Secretary of Defense. It must also reflect an acceptable level of information and justification for the DSARC principals to judge the worth of System X for development.

In this light, and because of time limitations, the effort is limited to a DCP for DSARC I, and entry into the Validation Phase of development.

This report presents the DCP together with descriptions of the governing regulations, directives and instructions; comments on DCP formats and content in general; and recommendations for future System X related activities. The DCP will be found as Appendix I.

Section II. REGULATIONS, DIRECTIVES AND INSTRUCTIONS

A Development Concept Paper (DCP) documents the need for a system program together with a plan for the program (1:3).1/ Fundamentally, under DODD 500.1, the DCP defines issues, special logistics problems, program objectives, program plans, performance parameters, areas of major risk, system alternatives, acquisition strategy and thresholds. A specific ~~outline~~ for the DCP preparation is not provided, leaving some flexibility to the Services in their preparation.

The DCP serves as a record of the Service position and SECDEF/DEPSECDEF approvals (2:A-1, 4:3-1, 9:4, 10:Encl 1) for major system developments. As such, it constitutes a contract between OSD and the Army or other Services. DODI 5000.2 (DRAFT) (3:2) would change the name of the DCP to "Decision Coordinating Paper" and provide additional guidance as to the relationship of the DCP to the decision process and to the Five Year Defense Plan.

The content and format for the 20 page DCP are spelled out in more detail by Army and Air Force documentation implementing DODD 5000.1 (4:B-1, 5:Annex G, 10:A3-1). Basically, the Army prescribed format includes the following information:

- I. Nature of the Program
- II. Background

1/ Bibliography notation. First digit indicates source number, second digit is the page.

III. Management Issues

IV. System/Program Alternatives

- A. Technical and Operational Characteristics
- B. Costs, Funding and Cost Effectiveness
- C. Schedules and Milestones
- D. Risks
- E. Reliability, Availability, Maintainability, Durability

V. Assessment of Program Alternatives with Recommendations

VI. Cost, Schedule and Performance Thresholds

VII. Test and Evaluation

VIII. Logistical Support

IX. Security Classification Guidelines

See Annex A for the detailed Army and the Air Force prescribed formats.

DODD 5000.3 Test and Evaluation (6:6) provides guidance for the DCP test and evaluation statements. The statement will include the following for a DSARC I:

- a. Critical questions and risk areas to be resolved by test and evaluation.
- b. Summary of test objectives, schedules and milestones.

For later DSARC's, further statements are needed plus summaries of test results. DODD 5000.4 OSD Cost Analysis Improvement Group (CAIG) (7:2) provides for CAIG review, and assessment of cost objectives prior to their inclusion in approved DCP's.

The guidance contained in the formal documentation provides a good starting point for DCP preparation. It is fairly general, however, and actual preparation will also be guided by previously submitted DCP's and the cognizant OSD staff member.

During the course of this exercise, 20 DCP's were reviewed, from which six outlines were extracted to form the basis for this report. All were in general agreement with written guidance, but formats were modified to fit the individual subjects.

Generally, a DCP provides statements of the program issues, threat and need within the first two or three pages. The balance of the pages is used in various ways to provide statements of how the problems are to be overcome and what the cost and schedules will be.

The last two pages of the DCP are provided for the comments and recommendations of the DSARC principals and to record the Secretary of Defense decisions and approved thresholds for cost, schedule and performance. These are included in the 20 page limit and must be considered during DCP preparation.

Section III. PREPARATION OF THE DCP AND OBSERVATIONS

Since the intent of this effort was to provide a DCP for System X that approximates a real DCP, it was necessary not only to research regulations but also to enter the world of DCP review. The initial entry was made through the Secretary of the DSARC. His office has, on file, all the DCP's submitted by the Services.

From the DCP's reviewed, six outlines were extracted to provide the basis for the System X DCP. At the same time, observations were made as to the similarities and differences in the various documents. Most took full advantage of the 20 pages allowed. Several techniques were obviously used to maximize the number of ideas and explanations that could be used in support of a program. Some common ones were: narrow margins on top, bottom and sides; tabularized data; reduced size type (appeared to be typed on large paper and reduced by 1/3 to 1/2); use of "resource annexes" to provide funding data outside the 20 pages; concentration of discussion on particular information thus providing non-equal treatment of sections; and referral to other documents such as development plans or test plans previously provided. No single Service had an edge on maximum use of 20 pages.

The DCP's from a given Service were not all formatted in the same way. Format depended on what material was being presented, what was being proven and what seemed to be the most logical approach to the problem. Across the Services, the documents differed in much the same way. Headings for paragraphs were slightly different but overall the Army, Navy and Air Force documents were quite similar.

The main differences in DCP's showed up between those for DSARC I, II and III. As would be expected, the DCP's for each succeeding milestone are more specific and comprehensive than preceding ones.

The spectrum of alternatives presented was interesting. They included such things as: choice of technical approaches, choice of acquisition strategies, choice of technical approaches with suboptions of acquisition, and in an extreme case - to go ahead with the program or terminate it. No matter what the alternatives were, however, clear choices were always presented to the DSARC for their consideration and recommendation. Except in one case, the decisions expected were not "yes" or "no".

The next step in the DCP preparation was to combine the written word of directives with the knowledge gleaned from the actual DCP's and prepare an outline. The result is found in the SX-DCP at Appendix I.

The information for the DCP was extracted from System X exercises 1-10. The quantity and quality of information varied from poor to excellent, depending on the section of the DCP. Particular weaknesses were noted in the correlation of costs, schedule for development, technical description of system, risk analysis and descriptions of current systems. Particularly useful in the preparation were the threat in exercises 1 and 2 and the Program Management Plan (PMP) sections included in exercise 9. In the preparation of an actual DCP, the PMP would be the singularly most useful document available since it will contain most of the information needed. A good PMP for System X,

beefing up the noted weaknesses, would have been the prime contributor to a truly complete DCP.

In the actual preparation of a DCP, there would be continual dialogue between the Service and the OSD staff. A "for comment draft" would be prepared and submitted to ODDR&E. Conversations with some staffers lead me to believe that most DCP's are rewritten by the OSD man before being transformed into the "coordination draft". For that reason, I thought a few staff comments would be useful in this exercise.

The attached DCP has been reviewed by some people who are normally responsible for commenting on DCP's. Copies were distributed to ODDR&E, ASD(I&L) and ASD(PA&E). Only some DDR&E and ASD(I&L) comments were received in time for inclusion in this report. Time, as always, was too short for all to review and comment.

From the review and discussions with ODDR&E staff, some specific policies or criteria have emerged that do not appear specifically guidance documentation previously described.

1. Be sure to compare the proposed acquisition with what is currently available. In this context, it is necessary to say why the current capability cannot be upgraded to meet the threat. Often it will be necessary to include an upgraded existing system as one of the alternatives. The New Main Battle Tank DCP does this.

2. Foreign developments that could meet the requirement must be addressed. This is in response to the current OSD policy seeking NATO

interdependence for weapons systems. The Army's SHORADS DCP, for instance, addresses, as alternatives for the short range missile air defense role, three foreign systems as well as a US developed system.

3. Joint service interest must be noted. This places an obligation on the Service to ascertain if the other Services are interested in the system and to detail that interest in the DCP.

4. Competing technical approaches should be addressed if there are any.

Other comments from the reviewers that were specifically addressed to the System X DCP were:

1. The target destruction criteria of Table 3.3 were too "pat". This indicates some skepticism when numbers like "18" or "13" are mentioned as critical to force performance.

2. The system is very heavy to swim. The writer agrees, but the exercises say it will swim. It is highly likely that this point would be questioned in detail during a DSARC I from both the requirement and technical points of view.

3. The laser guidance option does not seem to fit the all weather requirement. Also, a detailed description is needed to describe the role of the aircraft and its ability to penetrate defenses as it impacts the overall effectiveness. This information is conspicuously absent in System X, but would be needed at a DSARC.

5. Specific comment was made that the time between DSARC II and III would be too short to make the RAM goals. This is scheduled as a three year period in System X.

6. The technical risk statements are weak and reflect a lack of technical knoweldge about the system. System X has a serious deficiency in the technical area since it is intended as a management exercise. This section of the DCP would need strengthening for a real DSARC.

7. There should be a performance threshold in the validation phase. This was not originally included in the DCP when reviewed. Forecasts for all costs beyond validation should be included in the threshold sections, although it is too early at DSARC I to place thresholds on them. There were no arguments with establishing the design to cost goal during validation.

8. Finally one reviewer provided an outline for a DCP as he would like to see it. He commented specifically on the decimal numbering system, but did not say one could not do it that way. The outline is at Annex C.

The comments were used to revise the draft. Obviously, in a real situation this would be the first step in an iterative process of review and revision until the document satisfied most parties. Comments from PA&E, Test and Evaluation and CAIG would also have impacted the final product. I would expect a significant challenge on the technical aspects of the system and requests for detailed descriptions of sub-system and component concepts.

Normally weapon systems receive significant questions in the areas of effectiveness, accuracy, range, and RAM. The technological state-of-the-art vs the risks of attainment would receive a thorough and detailed review to answer the questions.

This review, minimal as it was, pointed out one thing: The ultimate readers of the DCP are the OSD staff and the DSARC principals; therefore, the document should state the Service position and be tailored to the audience. This implies early and frequent interaction with OSD during the preparation so they fully understand the facts behind the 20 pages describing a complex system.

Section IV. CONCLUSIONS AND RECOMMENDATIONS

The thrust of this paper was preparation of a dummy DCP for System X and not the solution to a problem. Therefore, the conclusions and recommendations are limited to the value of the exercise and what could be done in future courses to aid in development of a final model DCP.

The exercise was extremely useful in providing an insight as to what constitutes the DCP and its importance to a program. It could serve as the basis for preparation of a DCP in a real environment, which was one of the goals of the study program.

Insofar as the DCP for System X is concerned, it could use strengthening in the technical areas. A thorough review is needed to identify specific shortcomings, and data needed to fill the holes. For example, reference is made to automatic targeting and check out by a console unit. Further, mention is made of risk areas due to weather, readouts, etc. A technical description of the unit is needed in terms of: how is targeting data received-radio receiver, light beam; how is it inputted to the unit - manually, automatically; how is it processed - computer, tapes; what is output form - signal to launcher, manual readout of data; what type display equipment - CRT, dials, LEM; and what happens to output - automatically sets launcher, manually transmitted and set. With such a description, the technical risk areas will have more meaning.

Since System X is basically a management exercise, the time and cost expended to upgrade technical descriptions may not be worth it in terms of increased model effectiveness. The recommendation is made only with regard to the DCP and the need, if any, to bring it closer to reality.

It is recommended that the document be reviewed by the faculty, contractor and, if possible, OSD personnel as a school sponsored exercise. Modifications to specific cost data and schedules should be made to provide a baseline document for use by students in SX 12-29. The final DCP could also serve as the basis for an updated version for DSARC II and possibly DSARC III in future exercises.

If the faculty evaluation of this exercise is favorable, recommend serious consideration be given to having students update or complete specific sections of the System X documentation (e.g., the PMP) as their individual study projects.

Section V. BIBLIOGRAPHY

1. Department of Defense Directive 5000.1, subject: Acquisition of Major Defense Systems, 13 July 1971.

Establishes policy for major defense systems acquisition throughout the Department of Defense. Provides the basis for project management, establishes purpose of Development Concept Papers, and designates responsibilities for preparation, coordination and approval of DCP.

2. Army Regulation No. 70-17, System/Project Management, 15 January 1973.

Establishes Department of the Army policy, responsibilities and procedures for system/project management. Provides insight into relationship of DCP to project management among other detailed descriptions of guiding documentation.

3. Department of Defense Instruction 5000.2, subject: The Decision Coordinating Paper (DCP) and the Defense Systems Acquisition Review Council (DSARC) DRAFT, 20 February 1973.

Establishes policy and instruction governing the use of the DCP and the DSARC in the decision making process at Secretary of Defense level. Changes the name of the "Development Concept Paper" to "Decision Coordinating Paper", and provides additional guidance in preparation.

4. Army Regulation No. 70-27, Development Plan/Development Concept Paper/Program Memorandum, 21 February 1973.

Prescribes policy, procedures and content for documentation, outlines processing responsibilities, describes interrelationships of the documents and connections with the DOD system review process.

5. Letter, Department of the Army, Office of the Assistant Chief of Staff for Force Development, subject: Letter of Instructions (LOI) for Implementing the New Material Acquisition Guidelines, 23 August 1972.

Provides detailed implementation instructions for weapon systems acquisition. Documentation, processes and reviews are covered. Annex G provides instructions on preparation of a DCP and contains much of the information later prescribed by regulation. A detailed outline for the DCP is provided.

6. Department of Defense Directive 5000.3, subject: Test and Evaluation, 19 January 1973.

Establishes test and evaluation policy within the DOD. Provides some information in type of test and evaluation input expected in a DCP.

7. Department of Defense Directive 5000.4, subject: OSD Cost Analysis Improvement Group, 13 June 1973.

Provides a charter for the CAID and prescribes the group interface with the DCP/DSARC process. Provides for CAIG input to DCP cost objectives.

8. System X Exercises 1-10, DSMS, Program Management Course 74-1.

Provides detail needed for DCP preparation.

9. Air Force Regulation No. 800-2, Program Management, 16 March 1972.

10. Air Force Systems Command Pamphlet AFSCP 800-3, A Guide for Program Management, 14 May 1971.
11. DCP No. 50, SAM-D, T. J. Kotonias, 11 Febraury 1972.
12. DCP No. 63, Heavy Lift Helicopter, COL R. L. McDaniel, 27 July 1970.
13. DCP No. 67, ULMS, 22 July 1971.
14. DCP No. 72, Non-Nuclear Lance, LTC J. Metzko, 24 April 1972.
15. DCP No. 77, Anti-Ship Missile (Harpoon), CAPT L. J. Stecher, 2 November 1970.
16. DCP No. 117, New Main Battle Tank, No Author, November 1972.

ANNEX A. FORMATS FROM ARMY AND AIR FORCE

PRELIMINARY OUTLINE

DEVELOPMENT CONCEPT PAPER/ARMY PROGRAM MEMORANDUM

- I. Nature of the Program - A brief statement of why the system is needed, what will be accomplished by the successful completion of the program, to include items in the current inventory that will be replaced and the best estimate of the quantities of the new system to be fielded. The threat should be discussed in this section.
- II. Background - Summary of the development history, past decisions, sunk costs, and testing results.
- III. Management Issues - The key issue or issues that the paper addresses and any issues that may arise before the next major milestone.
- IV. System/Program Alternatives - A comparison of alternatives will address the following:
 - A. Technical and Operational Characteristics.
 - B. Costs, Funding and Cost Effectiveness.
 - C. Schedules and Milestones.
 - D. Risks.
 - E. Reliability, Availability, Maintainability and Durability.
 - F. Impact on Force Design and Quantities of System Required.
- V. Assessment of Program Alternatives with Recommendations.
- VI. Cost, Schedule, and Performance Thresholds - Those critical aspects of the program that, if not met, would be sufficient cause to reconsider

the decision rendered. If appropriate, the "design to" parameters of the system will be included in this section.

VII. Test and Evaluation - A summary of the plan for test and evaluation stating the objectives of each test planned and the critical issues to be resolved by each.

VIII. Logistical Support - A summary of the plan for Integrated Logistics Support (ILS) and critical issues of supportability.

IX. Security Classification Guidelines.

GUIDE FOR PREPARATION OF A DEVELOPMENT CONCEPT PAPER

The Development Concept Paper will not be more than 20 pages in length and will be tailored to the specific program. Generally, the outline will be prescribed by the OSD project officer and will contain the following sections:

SECTION	SUBJECT
1	The Management Issue
2	The Reasons for Having the Problem
3	Ways of Solving the Problem
4	Anticipated Resource Needs of the Program
5	Anticipated Schedule for the Program
6	Risks the Program Faces
7	Program Difficulties
8	Evaluation

SECTION

SUBJECT

9

Decision Options

10

Recommendations

11

Signature Page

ANNEX B. OUTLINE DCP FROM ODDRE STAFF ASSISTANT

- I. Purpose
- II. Program Issues
- III. Program Background and Scope
 - A. Background on
 - Present Capability
 - Limitations of Present Capability
 - Requirement
 - New System Definition Studies
 - B. Scope
- IV. Expected Improvements
 - Proposed Characteristics vs Current
 - Comparison of Effectiveness, etc.
- V. Program Synopsis
 - A. Technical
 - Current Program
 - Future Program
 - B. Schedule
 - Major Milestones
 - C. Management
 - D. Contractual
 - E. T&E
 - F. Program Costs

G. Risk Assessments of A, B, etc. above.

VI. Thresholds

VII. Other Factors

A. Foreign Developments

B. Joint Service Use

C. Competing Technical Approaches

VIII. Security

IX. Forthcoming Decisions

X. Next DCP

XI. Comments and Coordination

APPENDIX I

This section consists of a Model DCP for System X.

DCP No.

15 May 1974

AUTHOR: Mr. A. Catona,

ODDR&E

For Coordination Draft

DDR&E Log No. 74-

DEVELOPMENT CONCEPT PAPER

VERSATILE TACTICAL MISSILE (VTM) SYSTEM

1. PURPOSE. The purpose of this DCP is to set forth the requirements for and alternatives to system acquisition of a Versatile Tactical Missile System (VTM) capable of providing non-nuclear tactical fire support to the ground forces in all conditions of weather, day and night, and all terrain. Generally, the tactical fire support mission requires the attack of a mix of targets 5-200 miles from the Forward Edge of the Battle Area (FEBA) in a European environment under all weather conditions during day or night operations.

1.2. Comparison. By means of systems analysis, the relative effectiveness of aircraft, artillery and missiles in the attack of a target array were compared. Each has a role in the tactical fire support mission, but the missile system appears most flexible in the face of constraints imposed by

target types, sizes, mobilities, locations and defenses; weather; day-night operation; cost to acquire, operate and maintain; and manpower requirements. Table 1.1 compares artillery, aircraft and missile capabilities to attack a target array as influenced by target characteristics and other factors. Relative cost and manpower requirements are also assessed.

TABLE 1.1
RESULT OF SYSTEM ANALYSIS FOR NON-NUCLEAR WEAPONS
RELATIVE CAPABILITIES FOR 1976

L = Low

M = Moderate

H = High Cap

	ARTILLERY	AIRCRAFT	NEW MISSILE	ABLE/BAKER 1/
TARGET				
Size	M	M	M	M
FACTORS				
Range	L	H	H	M
Mobility	M	H	M	L
Defense	H	L	H	M
Types	M	H	H	L
All Weather	L	M	H	H
Day-Night	M	M	H	H
Cost	L	H	M	M
Manpower	M	H	M	M

1/BAKER has nuclear capability only. ABLE is shortrange non-nuclear.

1.2.1. The comparison indicated aircraft and missiles have comparable operational flexibility with regard to most target factors, but when target defense is high, the aircraft attrition rate climbs and cost to

destroy a target exceeds that of a missile by 50%. All weather capability and day-night operation favor a missile system. The cost and manpower areas are high for aircraft due to numbers of men and planes required and attrition rates for both. Operation and maintenance costs for aircraft are significantly higher for aircraft than other systems. The artillery cost advantage is due to simplicity.

1.2.2. Current Capability. The current BAKER missile system has serious deficiencies in availability, in-flight reliability, set-up mobility and CEP that will prevent achievement of the required effectiveness against the threat from 1974 on. Additionally, the BAKER system, while having a 200 mile range, has only a nuclear warhead. The ABLE system is reliable but has only a 60 mile range and a small non-nuclear warhead. A \$35 million program to upgrade the BAKER setup time, availability and in-flight reliability, will be carried out and extend the system effectiveness to the 1977 time frame. System mobility will remain about the same. Nothing can be done about non-nuclear warheads for the BAKER missile since a complete redesign would be necessary to carry the additional weight. A decreased CEP would similarly require a major development effort in guidance. After 1977, the numbers and mobility of targets will have increased to the point that the mix of ABLE/BAKER systems will not be capable of neutralizing the missile allocated portion without increasing force levels by 100%. Even then, targets beyond 60 miles would receive nuclear attack since no non-nuclear capability would be available for BAKER system. Comparable increases in air forces levels would be needed if missiles were not used.

Mitigating against the use of air forces is the expected twofold increase in air defense density in the 0-200 mile region and a two to threefold increase in Pact forces electronic countermeasures capability. These defensive capabilities would increase attrition rates in excess of 50% beyond currently calculated rates.

1.2.3. Artillery is severely hampered by range limitations and thus cannot attack throughout the array. It is limited to targets within 20 miles of the FEBA.

1.3. The analysis showed the need for a balanced mix of weapon systems concepts for use in the mission scenario. Aircraft would attack targets more than 200 miles from the FEBA as primary mission with closer targets as secondary missions. Artillery would attack those targets within their range, up to 20 miles from the FEBA. A new tactical missile system would be needed for the targets 5 to 200 miles from the FEBA with capability optimized between the 20 and 200 mile ranges. This mix has been agreed to by OSD and the services as the best counter to the threat.

2. MANAGEMENT ISSUES.

2.1. The issues arising from the analysis and addressed by this DCP are:
Should the Versatile Tactical Missile System be approved for validation phase development and which of four alternatives should enter validation?

2.2. The alternative missile systems include an inertially guided system VTM110X; an inertially guided missile with laser terminal guidance VTM110X-LG; an inertially guided system VTM110X (Austere), and a less sophisticated inertially guided system VTM-B.

3. REQUIREMENT.

3.1. Threat. During the projected 1976-1985 time period, there will be deficiencies in existing Allied weapon capabilities to attack an array of Warsaw Pact targets. The target array consists of fuel dumps, ammunition dumps, supply routes, artillery and air defense locations, and troop concentrations. The targets will have varying mobility and defensive capabilities. This array is defined as the threat.

3.1.1. The target array is expected to be distributed as shown in Table 3.1. The distances from the Forward Edge of the Battle Area (FEBA) and numbers of targets indicate need for a weapon system with a range of 5-200 miles. These targets will be located by Allied forces to within 50-300 meters depending on the equipment used.

TABLE 3.1 TARGET LOCATIONS

DISTANCE FROM FEBA (Mi)	NUMBER OF TARGETS					Total
	Fuel Dumps	Ammo Dumps	Supply Routes	Artil & Air Def	Troop Conc	
5 - 10	0	0	7	390	400	797
11 - 50	13	13	7	10	200	243
51 - 100	10	10	8	50	100	178
101 - 200	15	15	8	50	100	188
TOTAL	38	38	30	500	800	1406

3.1.2. The array can be described in terms of size, mobility, defense and detectability. Table 3.2 summarizes these characteristics.

TABLE 3.2 TARGET CHARACTERISTICS

	Fuel	Ammo	Supply	Arty &	Troop
Characteristics	Dump	Dump	Rte	Air Def	Conc
Radius (meter)	50-200	50-200	5-10	5-25	5-1000
Mobility ¹	M	M	L	M-H	H
Defense ²	H	H	M	M-H	L
Detection ³	L	L	M	L-M	M

¹Mobility - L-Low: Relocation 2 or more days

M-Moderate: Relocation 1 or 2 days

H-High: Relocation few hours

²Defense - L-Low: Small arms

M-Moderate: SA II and Molidska 3B AA

H-High: SA III and Zuka 183 AA

³Detection - L-Low: Camouflage requiring IR and other sensors

M-Moderate: Visible detection possible

The attack of targets with these characteristics, combined with a projected step increase in electronic countermeasures capability in 1976, requires a system with high flexibility and the capability to penetrate the defenses.

3.2. Present Capability. An analysis¹ of the currently available artillery, aircraft and missile systems against the projected threat shows

¹"The Non-nuclear Threat and Tactical Fire Support Requirements Posed by Warsaw Pact Countries, 1976-1985".

a continually decreasing capability to destroy targets. Table 3.3 shows total targets to be destroyed by the combination of artillery, ABLE, BAKER, and aircraft systems for neutralization of RED forces, and the increasing deficit by year in terms of targets remaining. The key to the deficit lies in ABLE/BAKER missile system deficiencies previously noted. The actual crossover point is about 1974.

TABLE 3.3 TARGET DESTRUCTION

	Fuel	Ammo	Supply	Troop	Arty &
	Dumps	Dumps	Routes	Conc	Air Def
<u>1971</u>					
Nr Tgts ^{1/}	27	27	26	800	340
Nr to be Destroyed ^{2/}	18	18	13	200	170
Capability to Destroy ^{3/}	18	18	13	200	170
Nr Remaining	0	0	0	0	0
<u>1976</u>					
Nr Tgts	30	30	28	800	390
Nr to be Destroyed	20	20	14	200	195
Capability to Destroy	18	18	13	184	184
Nr Remaining	2	2	1	16	11
<u>1985</u>					
Nr Tgts	48	48	33	800	600
Nr to be Destroyed	32	32	16	200	300
Capability to Destroy	20	20	11	152	252
Nr Remaining	12	12	5	48	48

^{1/}Targets to be engaged

^{2/}Number to be destroyed to neutralize RED Forces

^{3/}Estimate of capability gap between Allied and RED Forces

The deficits in target destruction result from increased target numbers, higher mobility, and increased defensive capabilities. Thus in the 1974-1985 period, the Pact nations pose an ever increasing threat in terms of targets remaining to be destroyed for neutralization of attacking forces.

3.3. System Objectives and Characteristics. Constant effectiveness models were used to determine performance characteristics, acquisition objectives and costs for a tactical missile system that would have the necessary force effectiveness. Force effectiveness is specified in terms of targets to be destroyed for neutralization of Red Forces by Blue Forces under a given operational concept. The analysis considered the current system and new systems.

3.3.1. Operational Characteristics. Where possible these are stated in bands of desired and maximum or minimum values. The operational concepts driving these characteristics are summarized in Table 3.4. The concept generally follows that used by currently deployed units, modified to take advantage of increased capabilities.

TABLE 3.4 OPERATIONS

Organization	- Unit with 6 launchers, 40 missiles, 40 warheads (Non-nuclear and Nuclear); Support Detachment
Deployment	- Remote protected position. Move to firing position near FEBA.
Movement	- Move at speed of armored column on roads and across country, to include swimming.
Firing	- Time to set up, check out and fire is reaction time Fire each additional missile at same or different targets. Time between missiles is rate of fire.

Post-Firing - Reload launcher, move to new site.

3.3.2. Performance Characteristics. For a .90 fractional destruction of the postulated threat target array, the parameters in Table 3.5 have been established.

TABLE 3.5 REQUIRED PERFORMANCE PARAMETERS

PARAMETER	VALUE	REMARKS
Warhead weight	800 - 850 lbs	Non nuclear. Nuclear is
Range	<u>20</u> * - 200 miles	
Circular Error Probable	<u>250</u> - 300 meters	
Penetrability	.80 - <u>.90</u>	Capability to penetrate defenses
Availability	.85 - <u>.90</u>	Inherent
Inflight reliability	.90	
Rate of fire	.5 - 3.0 minutes	.5 min fire same tgt 3.0 min fire different tgts
Reaction time	<u>5</u> - 10 minutes	Time to set up
Swim Speed	4 knots	
Cruise speed	40 - <u>50</u> mph	Improved roads
Cruise radius	200 miles	
Gross weight		Vehicle, launcher, 4 msls
Crew size	3 or less	

*5 mile minimum range is desired

3.3.3. Acquisition objectives. Projected deliveries and overall acquisition objectives for deployment are:

FY 76	10 Units*
FY 77	20 Units
FY 78-82	150 Units
FY 82-83	<u>20 Units</u>
TOTAL	200 Units

*One unit consists of 6 launchers, 40 missiles and associated equipment.

3.4. Summary. In summary the need for an all-weather Versatile Tactical Missile as part of a balanced force mix is based on:

- The existence and projected increases in Warsaw Pact targets to be destroyed.
- Known deficiencies in current missile availability, reliability, accuracy and response time with resultant lack of capability to neutralize RED forces.
- Relatively large percentage of time that weather conditions reduce visibility in Europe.

4. NEW SYSTEM ALTERNATIVES. Four concepts have the potential to meet the requirements. Two concepts, VTML10X and VTML10X (Austere), are the same, with only alternative approaches to the ground equipment. The third concept, VTML10X-LG, uses the VTML10X concept modified with a laser type terminal guidance capability for increased accuracy. The fourth concept employs a different missile with the same ground equipment as the VTML10X.

4.1. All alternatives will have certain common characteristics. The vehicle will be the currently produced T-180 tank chassis with self leveling and stability system. The storage and launcher unit (4 missile capability), checkout and targeting console, and launch console will be mounted on this

chassis. Use of the T-180 will provide mobility for the VTM system comparable to that of a medium tank and provide a swim capability. All alternatives will use the same warheads. Warheads will be variable yield nuclear or non-nuclear (high explosive or sub-munition).

4.2. Alternative descriptions.

	ALT I VTM-110X	ALT II VTM-110X (AUSTERE)	ALT III LG	ALT IV VTM-B
<u>Missile Propulsion</u>				
Standard solid propellant				X
Solid PBAN-AP Propellant	X	X	X	X
Variable Thrust	X	X	X	
Thrust vector control	X	X	X	X
Thrust termination	X	X	X	X
Terminal guidance rockets			X	
<u>Missile G&C</u>				
Strap down inertial guidance	X	X	X	X
Integrated circuit computer	X	X	X	
Low accuracy micro-circuit computer				X
Laser seeker/terminal guidance			X	
<u>Launcher & Consoles</u>				
T-180 tank chassis	X	X	X	X
4 missile storage & launch	X	X	X	X
Automatic leveling	X	X	X	X
Automatic checkout	X	X	X	X
Use modified ABLE/BAKER				
Console units ^{1/}		X		
<u>Warhead</u>				
Nuclear variable yield	X	X	X	X
Non-nuclear	X	X	X	X

^{1/}Need newly developed program monitor in addition to modified units.

4.3. COMPARISON OF PERFORMANCE CHARACTERISTICS OF ALTERNATIVES

TABLE 4.1 NOMINAL VALUES OF CRITICAL PARAMETERS

PARAMETER	REQUIRED	BAKER	ALT I	ALT II	ALT III	ALT IV
Non-nuc						
Warhead Wt	800-850 lbs	None	800-850	800-850	800-850	800-850
Range	20*-200 mi	50-200	20-200	20-200	20-200	20-200
CEP	250-300m	450	250	250	60	350
Penetra-						
bility	.80-.90	.9	.9	.9	.95 ¹ /	.8
Availa-						
bility	.85-.90	.8	.9	.85	.8	.85
In flt Rel	.90	.8	.9	.9	.75	.8
Reac Time	5-10. min	40	5-10	5-10	5-10	5-10

*5 mi minimum range desired.

¹/Does not account for airborne illuminator/designator system.

The key areas of differences are CEP, penetrability, availability and in flight reliability.

4.3.1. The CEP affects the number of missiles needed to defeat a target of given size. The laser guided Alternative III provides the smallest CEP (60 m) and therefore the highest accuracy due to the terminal guidance feature. The highest value for the Alternative IV, VTM-B is due to the limited accuracy guidance package, the lack of variable thrust and the dependence on accurate launch platform leveling.

4.3.2. Penetrability is indicative of the capability to defeat air defense and electronic countermeasures to reach the target. Alternatives I - III

have roughly comparable values, but VTM-B, due to its difficult to harden circuitry, will be most susceptible to electronic countermeasures.

4.3.3. Availability is a measure of the system readiness to fire. The lowest value is for Alternative III, VTM 110X-LG, due to the expected sensitivity to the prelaunch availability of the laser guidance package. This package would be more complex than the other approaches and is therefore expected to have a lower reliability both in checkout and in flight.

Alternative II, VTM 110X (Austere), uses modified BAKER launch equipment that is expected to have lower reliability than newly developed equipment.

Alternative IV, VTM-B, uses a standard solid propellant motor that will not withstand the environment (temperature, shock) so well as the polybutadiene binder propellants used for the other alternatives.

4.3.4. In flight reliability is a measure of missile performance after launch. It is directly related to the reliabilities of the guidance and control system and the propulsion unit. The VTM110X-LG with a laser seeker has the most complex guidance scheme thus more chance for failure and lowest reliability, in trade for a four fold increase in accuracy. The VTM-B has a standard solid propellant option that does not have the inherent reliability of performance of the newer high strength polybutadiene propellants to be used in VTM110X, 110X-LG. Its guidance system is simple and expected to achieve a reliability similar to that of the VTM110X. The complex thrust variation/termination capabilities for Alternatives I, II, III will lead to some reliability difficulties due to problems in materials and mechanisms.

4.4. Comparison of Operational Effectiveness.

4.4.1. The constant effectiveness model uses a constant fractional destruction criterion of .90 per fire mission. This is, in turn, directly related to the number of fire units needed to destroy the postulated threat target array for given operational characteristics. To compare relative effectiveness of these alternatives, the number of needed fire units for each will be compared. Fire units consist of six launchers, forty missiles, associated ground equipment and crews.

4.4.2. TABLE 4.2 EFFECTIVENESS COMPARISON

	<u>BAKER</u>	<u>ALT I</u>	<u>ALT II</u>	<u>ALT III</u>	<u>ALT IV</u>
Number of Units	405	204	204	183	303

The number of units' needed with the VTM-B system is 303, about 50% higher than the VTM110X options. This is due to three factors: the large CEP, the lower in flight reliability and the lower penetrability. Thus, more missiles are required in a given time for target neutralization. As would be expected, the small CEP and somewhat better penetrability of the VTM110X-LG compensate for the low in flight reliability and produce more kills per unit. Thus the VTM110X-LG would have the lowest requirements for fielded units to achieve a given level of destruction.

4.5. Comparison of Life Cycle Costs (LCC)

4.5.1. Use of the constant effectiveness model has produced estimates of the life cycle costs anticipated for the VTM system. The costs have been developed on the basis of the postulated threat and reflect the total research, development test and evaluation (RDTE); production (PEMA); and operation and maintenance (O&M) costs projected over a

ten year useful life after production. Costs were balanced against the performance parameters. The values for both represent points beyond which small performance increases could be achieved only with very high cost differentials.

TABLE 4.3 LIFE CYCLE COST COMPARISON

TYPE COST	COSTS (MILLIONS)				
	BAKER ^{1/}	ALT I	ALT II	ALT III	ALT IV
RDTE	35	241	207	300	178
Procurement	668	628	615	738	702
O&M	2723	804	804	729	1163
Life Cycle	3426	1673	1626	1767	2043
Unit Hardware	2.3	3.1	3.0	4.0	2.3
Unit Acquisition	2.4	4.3	4.0	5.7	2.9

^{1/}Future costs for improved BAKER, modifications to existing units, 200 new units. Does not include cost of existing equipment or sunk O&M.

4.5.2. Life Cycle Cost (LCC). The analysis in Table 4.3 shows that the complex VTM110X-LG is the most expensive to develop and procure, but its life cycle costs are lower than the simpler VTM-B. This apparent disparity is a direct result of fewer VTM 110X-LG units to be fielded to gain a .90 fractional kill and thus 40% lower O&M costs. The VTM 110X (Austere) and VTM 110X fall between VTM-B and VTM 110X-LG on RDTE and O&M costs. Both have comparable LCC, but VTM 110X (Austere) has lower RDTE and PEMA. They represent the mid point of complexity and the number of units to be fielded for either one is 70% that of the VTM-B and about 10% more than VTM 110X-LG. Thus the need for manpower is slightly more than for VTM 110X-LG, but much

less than for VTM-B. Procurement costs of both versions of VTM 110X are lowest due to the combination of unit hardware cost and number of units to be purchased being lower than either the VTM-B or VTM 110X-LG. Procurement will require only tooling for any of the units thus non-recurring costs are minimal. The improved BAKER would require the most fielded units and thus have the highest O&M costs and LCC.

4.5.3. Unit Costs. The VTM-B is by far the best new system for low unit hardware and acquisition costs. Its simplicity and lack of sophistication hold down RDTE and PEMA costs. Another production cost factor is the large number of units to be fielded with resultant volume effect on cost. The most complex system, VTM110X-LG has highest unit costs, as would be expected. The VTM110X (both versions) falls between VTM-B and VTM110X-LG in sophistication and unit costs. The BAKER would equal the VTM-B, but have less capability for the cost.

4.6. Comparison Summary. In terms of LCC, the VTM 110X and VTM 110X (Austere) are close. The BAKER system would be highest, followed by VTM-B because of the high manpower and support costs to keep 300-400 units in the field. The low O&M costs for the VTM 110X-LG place it midway in LCC. The BAKER system appears favorable on the basis of unit cost, but it doesn't compare in performance with the other systems; given a non-nuclear given warhead capability. Thus one of the new systems should be developed to replace BAKER/ABLE.

5. RISK ASSESSMENT. Technology for the three alternatives has been demonstrated in other systems but has never been integrated into a missile system with the projected capabilities of the VTM. A summary of the risks for all alternatives is shown in Table 5.1.

5.1. Risk Definition. A high risk is assessed where feasibility of a state-of-the-art has not been demonstrated. A moderate risk is assessed for a state-of-the-art advancement with demonstrated feasibility but without demonstrated performance or inadequate performance with experimental or advanced development hardware. A low risk item has attained satisfactory performance with advanced development or system hardware over limited test or operational conditions.

TABLE 5.1 RISK ASSESSMENT

SUBSYSTEM AREA	ALT I VTM 110X	ALT II VTM 110X	ALT III VTM 110X-LG	ALT IV VTM-B
	(Austere)			
Missile Assembly	Mod-High	Mod-High	Mod-High	Mod
Propulsion	Mod-High	Mod-High	Mod-High	Low-Mod
Guidance & Control	Mod	Mod	High	Mod
Terminal Guidance	-	-	High	-
Warhead	Low	Low	Low	Low
Cmd, Storage & Launch	Mod	Low	Mod	Mod
Checkout and Target	Mod	Low-Mod	Mod-High	Mod
Program Monitor	Mod-High	Mod-High	Mod-High	Mod-High

5.2. Technical Risk. The technical risk assessment balanced each subsystem against technology areas expected to contribute to overall risk. Following are summaries of each area with moderate or high risk and potential shortcomings.

5.2.1. Missile Assembly. The need for lightweight, strong and durable materials and the development of new bonding techniques could lead to producibility and reliability problems. The restrictions on missile size and weight, combined with heavy warheads and long range requirements, dictate the need for high strength lightweight materials and new fabrication techniques such as adhesive bonding. Many of the concepts are as yet untested in large, highly stressed missile structures and represent risks.

5.2.2. Propulsion. High performance propellants and in flight performance with thrust variation, vector control and termination have been demonstrated with other solid propellant systems but may still lead to problems. Thrust variation and termination have potential materials and mechanical problems. So far, demonstrations have been limited to laboratory experiments and small missile firings. Some risk is associated with the standard propellant not meeting thrust and in flight reliability requirements.

5.2.3. Guidance and Control. All systems have a moderate risk except the VTM110X-LG. The primary risks are associated with performance of the strap down units, computer integration accuracy, and achieving rugged integrated circuits at low weight (1 pound of guidance requires 4 pounds of missile weight). The VTM 110X-LG guidance incorporates a laser for terminal guidance and the interface with the inertial system during the

final pre-impact flight phase is expected to be a problem, thus a higher risk than the others. This system will also have more weight and in-flight reliability problems than the simpler units without laser sensors.

5.2.4. Terminal Guidance. Only the VTM 110X-LG has this option. The laser mode has been demonstrated on bombs and small aircraft launched missiles, but never in a package to be carried by a large tactical missile. The guidance system is sensitive to weather and night restrictions and it is dependent on successful technical and operational integration with the laser illuminators currently used in aircraft. Technical factors in weight, seeker stabilization, band width, power, gain and noise also must be resolved. Overall, this technique offers high accuracy in operation, but can lead to cost and schedule problems during development and may prove to be somewhat unrealistic to produce for all missiles due to weather restrictions on aircraft operation and sensor detection of reflected illumination.

5.2.5. Checkout and Target. The system alternatives have a moderate risk in this area due to weather, day/night operation and production requirements. There will be some degradation of the components and compromises between technology and practical considerations of weight, size, reliability and maintainability to improve image readout, target identification and airborne assistance coordination. The VTM 110X-LG is particularly sensitive to the airborne coordination factor.

5.2.6. Program Monitor. This area reflects moderate to high risk due to sensing and signal devices and the computer. There is a proposed optical-digital signal processing interface for matching and translation

of inputs to the computer. This system is part of the communications net and must process data automatically during the targeting and ready to fire phases. The computer itself presents a problem with digital memory capacity and optimization for the fire control mission. These areas influence capability to react, and fire missiles at different or the same target within reasonable times. This directly impacts the number of units necessary to provide the .90 fractional kill.

5.2.7. Cost and Schedule Risk. Cost risk was simulated using a Monte Carlo technique that measured a probability distribution of RDTE cost assuming an uncertainty in the cost for a fixed schedule. The analysis considered RDTE cost with a minimum of \$210 million, mean of \$255 million and maximum of \$300 million. There is a 50 percent probability of a \$45 million overrun based on \$255 million as a median case. The schedule risk was simulated using a standard statistical schedule network technique. The analysis showed a 50 percent probability of 8.5 months schedule slip for all cases in development.

5.3. Risk minimization. The use of system prototyping will concentrate on the identified difficult subsystem problems. It is expected that system integration problems will be identified and solved or partially solved. This approach will provide early identification and solution of problems before entering full scale development. Other approaches such as subsystem or component prototyping would reduce risk in the noted areas, but there would remain a large number of unknowns in the integration area. The full system prototype approach will reduce technical risk, provide

solid data on which to base full scale development estimates of cost and schedule, and provide early determination of the probability of achieving a system that will meet requirements. The likely outcome will be an overall assessment of low to moderate risk for all system elements in full scale development.

6. MILESTONE SCHEDULES AND FUNDING FOR ALTERNATIVES. All alternatives will follow the same basic schedule to meet an IOC in FY 77. There are variations in schedule risk associated with the alternatives, but all should meet the overall milestones shown. Funding by phase is shown for each alternative in Table 6.1.

TABLE 6.1
MILESTONE AND FUNDING SCHEDULES

	FY 71	FY 72	FY 73	FY 74	FY 75	FY 76	FY 77
		VALIDATION		FULL SCALE	DEVELOPMENT		PROD/DEPLOY
			DT/OT I		DT/OT II		OT III
		SOURCE SELECTION ACTIVITY					
			DSARC II			DSARC III	IOC
FUNDING 1/ (RDTE/PMA) ALT I		72/0		169/50			0/578
ALT II		72/0		135/50			0/565
ALT III		72/0		238/50			0/678
ALT IV		36/0 2/		142/50			0/652

1/ Millions of Dollars

2/ One Contractor

6.1. Milestones. Funding levels are predicated on competitive prototyping during validation phase for Alternatives I-III and sole source prototyping for Alternative IV (contractor developed approach). Procurement funding levels for final phase of full scale development are for production engineering and tooling. There are three main milestones to be met:

6.1.1. Milestone I. Approval for entry to Full Scale Development.

- Event 1. Enter validation with one or more contractors.
- Event 2. Source Selection activity for award of FSD contract.
- Event 3. Accept prototype systems.
- Event 4. Test prototypes in DT/OT I.
- Event 5. DSARC II for entry to FSD.

6.1.2. Milestone II. Release of production funds.

- Event 1. Enter FSD with single contractor.
- Event 2. Conduct DT/OT II.
- Event 3. DSARC III for entry into production.

6.1.3. Milestone III. IOC

- Event 1. Begin LRIP.
- Event 2. Complete DT III.
- Event 3. Issue first units for IOC.

7. TEST AND EVALUATION PLAN.

7.1. Concept Validation Phase..

7.1.1. The critical testing issues are:

- a. System capability in terms of range, rate of fire, mobility, accuracy.

- b. Effectiveness of command and control.
- c. Susceptibility to countermeasures.
- d. Degradation of performance due to weather/night.
- e. Establishment of reliability, availability, maintainability ranges.

7.1.2. The test objectives will be satisfied by testing of 12 prototype missiles and 2 launcher/control units from each contractor in the competition. The tests will consist of contractor demonstrations of 8 missiles and user tests of 4 missiles. Depending on the number of contractors, this could result in testing of one or two systems during DT/OT I scheduled for 1st Quarter - 3rd Quarter FY 73. Tests will be conducted sequentially by the contractor/developer and the user at Black Rocks Missile Test Range. The early OT I complies with the provisions of DODD 5000.3.

7.2. Full Scale Development. Critical issues are not yet identified. It is anticipated that these will be established at the end of validation and reported in the next DCP. The anticipated testing includes engineering design testing and DT/OT II as specified in DODD 5000.3.

8. RELIABILITY, AVAILABILITY, MAINTAINABILITY. The overall reliability and maintainability goals are primarily specified in terms of inherent availability and in flight reliability. The specified inherent availability is .85 - .90 and the in flight reliability is .90.

Validation prototyping and testing will provide data needed to establish and verify ranges for all parameters. Maintainability estimates will be obtained at this time. Initial indications of achievability of reliability and availability values will be obtained.

9. INTEGRATED LOGISTIC SUPPORT. Planning will be consistent with DODD 4100.35. The plan will be developed during the validation phase, incorporated into the RFP for full scale development, refined and used to guide contractor and government efforts during development and deployment. Key issues to be resolved during the validation phase are:

9.1. Maintenance Allocation. Allocation of maintenance to organizational, intermediate and depot levels. Organizational maintenance at most should be limited to replacing sections and assemblies at battalion level. Intermediate levels should be provided by mobile maintenance teams with capability of fault isolation and repair of subsystems or assemblies. Depot level will perform repair of modules in addition to complete overhaul of systems.

9.2. Test Equipment. Test equipment concepts must resolve the use of special test sets or multi-purpose test equipment.

9.3. Tools. The design of the system is to minimize use of special tools and equipment. Where possible existing standard missile maintenance and other tool sets will be used.

9.4. Training. Maintenance personnel training is to be minimized through design practices that provide maintenance concepts compatible with existing organizations and skills.

9.5. Resupply. Concepts for resupply of missile units are to be developed. Key items are shipping containers for missiles, resupply vehicles and missile handling equipment.

10. MANAGEMENT AND PROCUREMENT PLAN.

10.1. Project Manager. The Project Manager is delegated full authority for the centralized management of the VTM project with headquarters

located at Missile Systems Command, Blackstone Arsenal. He reports directly to Commander, MSC and is authorized direct communication with Commander, Development and Support Command, the Department Chief of Staff, and the Secretary of the Department. He is assigned to the project without termination date.

10.2. Acquisition Strategy. There will be three major procurement phases applicable to all alternatives: Validation phase in form of competitive prototype with fixed price contracts; full scale development cost plus incentive fee contract; and a separate production contract to be negotiated after full scale development is completed.

10.2.1. Validation Phase. This phase will consist of three parts: Contractor selection; prototype development and testing; and contractor selection for full scale development. The objectives of validation are to:

- Update the statement of operational need;
- Establish specifications of system and subsystem performance, identify critical physical and functional interfaces and establish feasibility and military utility;
- Provide results of risk resolution and trade off;
- Prepare a Program Management Plan for full scale development;
- Complete RFP and receive acceptable contractor proposal(s);
- Update DCP with schedules, cost and performance thresholds; and
- Select the contractor for full scale development. During validation, it is expected there will be two contractors for prototype development for

Alternatives I-III. If alternative IV is chosen a single contractor is most likely.

10.2.2. Full Scale Development. The objectives are to:

- Produce the complete, detailed system definition;
- Provide test and evaluation results;
- Prepare a production and logistics plan with achievement milestones; and
- Complete a firm proposal (with options if appropriate) for the Production/Deployment Phase of the system.

The prime contractor will perform all work contracted for by the VTM SPO. The launcher vehicle work will be contracted to another contractor through the Vehicle Command. The vehicle will be provided as GFE to the VTM prime contractor. The Ordnance Command will provide the warhead as GFE. The VTM prime contractor will be responsible for integrating the missile, warhead and vehicle subsystems, and for operation of the total weapon system.

10.2.3. Production Phase. The objective of this phase is to produce VTM systems at the rate of production needed to deliver the last items in 2Q FY 1983. It includes production and delivery of all necessary support items. Production management will be by units consisting of 40 missiles, 6 launchers and a support detachment. It is expected that 6 production lot buys will be made: first buy of 20 units, second buy 30 units and four lots of 30 to 40 units each.

10.3. Design to Cost Goal. This will be established during the validation phase.

11. SECURITY CLASSIFICATION GUIDANCE. Countermeasure susceptibilities are classified _____.

Performance Characteristics are classified _____.

Overall VTM plan, funding levels, test data and schedules are classified _____.

External views are UNCLASSIFIED.

12. OTHER FACTORS.

12.1. Foreign Developments. There are no Allied missile systems existing or in development that will meet the requirement. NATO countries have expressed an interest in the US VTM development and are reviewing their requirements to determine the need for the VTM to replace their version of the ABLE/BAKER systems.

12.2. Joint Service Use. No requirement exists in other Services.

12.3. Competing Technical Approaches. There exists a storable liquid propellant concept that would provide the storage and handling capabilities of solids with the advantage of the high specific impulse of liquids. Some conceptual work has been accomplished, but no systems have been built nor have any subsystems been tested. At this time, the technical risk is considered too high for satisfactory use in the VTM.

13. OVERALL EVALUATION. The advantages and disadvantages of each alternative are presented below.

13.1. Alternative I, VTM 110X. Advantages. This system provides the upgrading of the tactical missile system needed for the 1976-1985 threat. It has growth potential for increased accuracy as technology becomes available. It will have good all weather and day/night capability.

Compared to the other alternatives, it represents a moderate cost development for the total life cycle. Maximum competition is available for the development.

Disadvantages. There are chances of high risk developments in the missile assembly and propulsion systems. It is rated as an overall moderate risk system.

13.2. Alternative II, VTM 110X (Austere). Advantages. Provides all of the advantages of the VTM 110X plus it uses modifications of existing ABLE/BAKER launch equipment designs and it has the lowest life cycle costs of the four alternatives.

Disadvantages. Has the same disadvantages as Alternative I plus a lower availability than Alternative I since it will use some ABLE/BAKER equipment designs that currently exhibit low availability. The modifications will bring it up to the low end of the required range.

13.3. Alternative III, VTM 110X-LG. Advantages. Provides the upgrading needed for the 1976-1985 time frame. It has the best accuracy, provides for the lowest number of operating units in the field and lowest O&M costs. Maximum competition is available for the development.

Disadvantages. The laser terminal guidance is dependent on aircraft borne illuminators and is weather sensitive. It has the highest risk guidance system and the highest development costs and procurement costs. Overall, it represents the highest risk system technically.

13.4. Alternative IV, VTM-B. Advantages. Lowest technical risk due to its reliance on standard technologies. Lowest development and unit costs. Provides all weather and day/night capability.

Disadvantages. Lowest accuracy, highest life cycle cost, highest number of units to be fielded for force effectiveness, no growth potential and probability exists for no competition in development.

13.5. Evaluation of Alternatives. Table 13.1 ranks alternatives by life cycle cost, development cost, procurement cost, unit cost, risk, growth, competition in development units required, and performance. The rankings are 1 to 4 from most to least desirable alternative. Where alternatives are equally desirable, they receive equal ranking.

TABLE 13.1 EVALUATION FACTORS

FACTORS	ALT I	ALT II	ALT III	ALT IV	REMARKS
LCC	2	1	3	4	
RDTE Cost	3	2	4	1	
PEMA Cost	2	1	3	4	
Unit Cost	3	2	4	1	
Risk	2	3	4	1	
Growth	1	1	2	3	
Competition	1	1	1	2	
Units Fielded	2	2	1	3	
All Weather	1	1	2	1	
Accuracy	2	2	1	3	

1 - Most desirable

4 - Least desirable

14. DCP REVISION. The next revision of DCP _____ will occur during the 3rd Quarter FY 1973 during DT/OT I. Final revision for DSARC II will occur end of 3rd Quarter FY 1973 after DT/OT I.

15. RECOMMENDATIONS AND COORDINATION

Comment:

Director
Defense Research and Engineering

Comment:

Asst. Secretary of Defense
Installations and Logistics

Comment:

Asst. Secretary of Defense
Comptroller

Comment:

Asst. Secretary of Defense
Program Analysis and Evaluation

SECRETARY OF DEFENSE DECISIONS

<u>Critical Thresholds.</u>	<u>This Decision</u>
Cost (Threshold 20% this decision)	
Validation Phase	\$75.6 million +20%
Forecasts	
Full scale development	\$250 million
Procurement total	\$600-\$700 million
Unit hardware	\$3-\$4 million
Life cycle cost	\$1.6-\$2.0 billion
Schedule (Thresholds +5 months for validation)	
Delivery of prototypes	1 July 1972 (+1 month)
Validation completed	31 March 1973 (+2 months)
Milestone DSARC II	April 1973 (+2 months)
Forecasts	
Milestone DSARC III	4QFY76
Performance	
Validation	25% degradation